AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0041] with the following amended paragraph:

[0041] The inverse-free Berlekamp-Massey Algorithm is a $2t$-step iterative algorithm:

$L^{(-1)} = 0;$

$\sigma^{(-1)}(x) = 1;$

$\lambda^{(-1)}(x) = 1;$

$\Delta^{(0)} = S_0;$

$\delta = 1;$

for $(i=0;\ i<2t;\ i=i+1)\{$

$\sigma^{(i)}(x) = \delta\sigma^{(i-1)}(x) + \Delta^{(i)}x\lambda^{(i-1)}(x);$

$$\cancel{\Delta^{(i+1)} = S_{i+1}\sigma_0^{(i)} + S_i\sigma_1^{(i)} + \ldots + S_{i-t+1}\sigma_t^{(i)};}$$

$$\underline{\Delta^{(i+1)} = S_{i+1}\sigma_0^{(i)} + S_i\sigma_1^{(i)} + \ldots + S_{i-t+1}\sigma_\tau^{(i)};}$$

if $(\Delta^{(i)} == 0 \parallel 2L^{(i-1)} \geq i+1)$

$\{$ $L^{(i)} = L^{(i-1)};$

$\lambda^{(i)}(x) = x\lambda^{(i-1)}(x);$

$\}$

else

$\{$ $L^{(i)} = i+1-L^{(i-1)};$

$\lambda^{(i)}(x) = \sigma^{(i-1)}(x);$

$\delta = \Delta^{(i)};$

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Please replace paragraph [0048] with the following amended paragraph:

[0048] Computation of the coefficients of the error-evaluator polynomial, $\Omega(x)$, follows directly

after calculating the error-location polynomial, $\sigma(x)$, using

$$\Omega_i = S_i\sigma_0 + S_{i-1}\sigma_1 + \ldots + \cancel{Si\text{-}t\text{+}1\sigma_{t\text{-}1}} + \underline{S_{i-t+1}\sigma_{t-1}} \quad i = 0, 1, \ldots, t-1$$

Please replace paragraph [0055] with the following amended paragraph:

[0055] The control signals A', B' and C' are arranged in a first cycle to calculate the first term of the expression for ~~$\sigma^{(i)}(x)$ Using~~ $\underline{\sigma^{(i)}(x)}$. Using the j^{th} multiply and accumulate cell MAC_j as an example, during a first cycle, the first multiplexer 102 is controlled, in response to an appropriate control signal, A', to select the input 108 bearing the signal or data value δ. The second multiplexer 104 is controlled, in response to a respective control signal, B', to select the second input 109 which bears the signal or value $\sigma_j^{(i-1)}$. The third mulitplexer 106 is controlled, in response to an appropriate control signal, C', to select its second input, which bears the value 0.

Please replace paragraph [0056] with the following amended paragraph:

[0056] Figure 2 shows the internal structure of an embodiment 200 of a multiply and accumulate cell. Each of the multiply and accumulate cells MAC_0 to MAC_t ~~have~~ has the structure shown in figure 2. It can be appreciated that the embodiment 200 shown in figure 2 comprises a finite field multiplier 202 arranged to multiply, using pre-determinable modulo arithmetic, the first, A, and second, B, inputs to the multiply accumulate cell 200. In a preferred embodiment, the finite field multiplier performs arithmetic over $GF(q^m)$, and, preferably, over $GF(2^m)$. The output 204 from the finite field multiplier 202 is fed to a finite field adder 206 where it is combined with the value presented at the third input, C, of the multiply and accumulate cell 200. The finite field adder 206 operates over GF (q^m). In preferred embodiments, $GF(q^m)= GF(2^m)$. A register 208 is provided to store the result of the finite field addition operation.

Please replace paragraph [0060] with the following amended paragraph:

[0060] The finite field adder is then arranged to add this result, that is, $\Delta^{(i)}\lambda_{j-1}^{(i-1)}$ [[$\Delta^{(i)}$]]

[[$\lambda_{j-1}^{(i-1)}$]]

Please replace paragraph [0067] with the following amended paragraph:

[0067] is calculated at step 306. The multiply accumulate cells MAC_0 to MAC_t are used at step 308 to calculate each of the terms of $\underline{\Delta^{(i+1)}=S_{i+1}\sigma_0^{(i)}+S_i\sigma_1^{(i)}+\ldots+S_{i-t+1}\sigma_t^{(i)}}$ $\cancel{\Delta^{(i+1)})=S_{i+1}\sigma_0^{(i)}+S_i\sigma_1^{(i)}+\ldots+S_{i-t+1}\sigma_t^{(i)}}$. A test is performed, at step 310, to determine if $\Delta^{(i)}=0$ or [[$2L^{(i-1)})$]] $\underline{2L^{(i-1)}}$ is greater than or equal to i+1. If the determination is positive, effect is given to [[$L^{(i)=L(i-1)}$]] $\underline{L^{(i)}=L^{(i-1)}}$ and $\lambda^{(i)}(x)=x\lambda^{(i-1)}(x)$ at step 312. If the determination at step 310 is negative, effect is given to $L^{(i)}=i+1-L^{(i-1)}$; $\lambda^{(i)}(x)=\sigma^{(i-1)}(x)$; and $\delta=\Delta^{(i)}$ at step 314. It will be appreciated that effect is given to steps 312 and 314 using the control signals, D', to corresponding multiplexers 126 to 132, to select the appropriate values at the inputs to those multiplexers 126 to 132 to implement the equations shown in steps 312 and 314. The control variable, i, is incremented by one at step 316. A determination is made at step 318 as to whether or not i is less than 2t, where $t=(N-K)/2$ for Reed-Solomon (N,K) or BCH(N,K) codes. If the determination at step 318 is positive, processing resumes at step 304. However, if the determination at step 318 is negative, the calculations for the coefficients of the error-locator polynomial, $\sigma(x)$, are completed.

Please replace paragraph [0069] with the following amended paragraph:

[0069] It will, therefore, be appreciated that
[[Ω_I]] $\underline{\Omega_i}=S_i\sigma_0+S_{i-1}\sigma_1+\ldots+S_{i-t+1}\sigma_{t-1}$, where $i=0,1,\ldots,t-1$.

Please replace paragraph [0048] with the following amended paragraph:

[0070] The calculation of $\underline{\Omega_i}$ [[D_i]] is similar to that of $\Delta^{(i)}$. It can be appreciated that the same arrangement shown in figure 1 can be used to compute $\Omega(x)$ after that arrangement has been used to calculate $\sigma(x)$. It can be appreciated that $\underline{\Omega_i}$ [[Q_i]] can be decomposed as follows
$\Omega_i^{(j)}=S_i\sigma_0$, for j=0; and
$\Omega_i^{(j)}= \Omega_i^{(j-1)}+S_{i-j}\sigma_j$, for $1\leq j\leq i$.

Please replace paragraph [0071] with the following amended paragraph:

[0071] Therefore, referring to figure 4, the control signal, A', for the first multiplexer 110 is arranged to select the third input, that is, S_i, as the input signal, a_0, to the lowest order multiply accumulate cell MAC_0. The second multiplexer 112 is arranged to select the second input, which bears the signal or data value for σ_0. Therefore, the second input to the lowest order multiply accumulate cell MAC_0 is σ_0. The control signal, C', for the third multiplexer 114 is arranged to be 0. It will be appreciated that the output signal, d_0, will be given by $S_i\sigma_0$, that is, [[$\Omega_j^{(0)}$]] $\Omega_i^{(0)}$. The second multiply and accumulate cell, MAC_1, calculates $S_{i-1}\sigma_1$. Therefore, the output of the finite field adder 120 is $\Omega_i^{(1)} = \Omega_i^{(0)} + S_{i-1}\sigma_1$. Similarly, the j^{th} multiply and accumulate cell, MAC_j, is arranged to select the third input 116 of the first multiplexer 102 and the second input 109 of the second multiplexer 104 to produce, at the output, d_j, the signal or data value [[$d_j=S_{i,j}\sigma_j$]] $\underline{d_j=S_{i-j}\sigma_j}$. Hence, the output of the finite field adder 122 is $\Omega_i^{(j)} = \Omega_i^{(j-1)} + S_{i-j}\sigma_j$. The output values of each of the multiply and accumulate cells are shown adjacent to the encircled 1. The encircled "2"s illustrate the progressive accumulation, by the finite field adders 120 to 124, of the d_0, d_1,...,d_j,... and d_t values to produce the overall expression for

Please replace paragraph [0073] with the following amended paragraph:

[0073] It will be appreciated that the calculation of [[Q_i]] $\underline{\Omega_i}$ takes a single clock cycle. Therefore, the overall calculation of $\Omega(x)$ will require t clock cycles since the co-efficients, Ω_i, i=0,...,t-1, are calculated in series using the arrangement 400 shown in figure 4 with each term, $S_{i-j}\sigma_j$, for $0 \leq j \leq i$, being calculated in parallel using sufficient of the multiply and accumulate cells MAC_0 to MAC_t.